

1 1. A digital frequency jittering circuit for varying the
2 switching frequency of a power supply, comprising:
3 an oscillator for generating a signal having a switching
4 frequency, the oscillator having a control input for varying the
5 switching frequency;
6 a digital to analog converter coupled to the control input
7 for varying the switching frequency; and
8 a counter coupled to the output of the oscillator and to the
9 digital to analog converter, the counter causing the digital to
10 analog converter to adjust the control input and to vary the
11 switching frequency.

1 2. The circuit of claim 1, wherein the oscillator further
2 comprises a primary current source coupled to the oscillator
control input.

3 3. The circuit of claim 2, further comprising a differential
4 switch, including:
5 first and second transistors coupled to the primary current
6 source;
7 a third transistor coupled to the first transistor; and
8 a fourth transistor coupled to the second transistor at a
9 junction.

1 4. The circuit of claim 3, further comprising a capacitor
2 coupled to the junction.

1 5. The circuit of claim 3, further comprising one or more
2 comparators coupled to the junction.

1 6. The circuit of claim 2, wherein the digital to analog
2 converter has one or more secondary current sources.

1 7. The circuit of claim 6, further comprising a transistor
2 coupled between each secondary current source and the counter.

1 8. The circuit of claim 6, wherein the primary current source
2 generates a current I and each of the secondary current sources
3 generates a current lower than I .

1 9. The circuit of claim 8, wherein the secondary current
2 sources generate binary weighted currents.

1 10. The circuit of claim 8, wherein the largest secondary
2 current source generates a current which is less than about 0.1
3 of I .

Sub 21
1 11. A method for generating a switching frequency in a power
2 conversion system, comprising:
3 generating a primary current;
4 cycling one or more secondary current sources to generate a
5 secondary current which varies over time; and
6 supplying the primary and secondary currents to a control
7 input of an oscillator for generating a switching frequency which
8 is varied over time.

9 12. The method of claim 11 further comprising the step of
10 clocking a counter with the output of the oscillator.

1 13. The method of claim 11 wherein the primary current is
2 generated by a current source.

1 14. The method of claim 11 wherein the primary current is I and
2 each of the secondary current sources generates a supplemental
3 current lower than I , and further comprising passing the
4 supplemental current to the oscillator control input.

1 15. The method of claim 14 further comprising binary-weighting
2 the supplemental current.

1 16. The method of claim 14 wherein the largest supplemental
2 current is less than approximately 0.1 of I.

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1 17. A method for generating a switching frequency in a power
2 conversion system, comprising:
3 generating a primary voltage;
4 cycling one or more secondary voltage sources to generate a
5 secondary voltage which varies over time; and
6 supplying the primary and secondary voltages to a control
7 input of a voltage-controlled oscillator for generating a
8 switching frequency which is varied over time.

1 18. The method of claim 17 further comprising clocking a counter
2 with the output of the oscillator.

3 19. The method of claim 17 wherein the primary voltage is V and
4 each of the secondary voltage sources generates a supplemental
5 voltage lower than V, further comprising passing the supplemental
6 voltage to the voltage-controlled oscillator.

7 20. The method of claim 19, wherein the supplemental voltage is
8 binary-weighted.

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1 21. A frequency jittering circuit for varying a power supply
2 switching frequency, comprising:
3 an oscillator for generating a signal having a switching
4 frequency, the oscillator having a control input for varying the
5 switching frequency; and
6 means coupled to the control input for varying the switching
7 frequency.

1 22. The circuit of claim 21 wherein the means for varying the
2 frequency further comprises:
3 one or more current sources coupled to the control input;
4 and

5 a counter coupled to the output of the oscillator and to the
6 one or more current sources. /a

Sub 24
1 23. The circuit of claim 22 wherein the oscillator further
2 comprises:

3 a primary current source coupled to the control input; and
4 a differential switch coupled to the primary current source.

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1 24. The circuit of claim 22 wherein the differential switch
2 further comprises:

3 first and second transistors coupled to the primary current
4 source;

5 a third transistor coupled to the first transistor; and

6 a fourth transistor coupled to the second transistor at a
7 junction.

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1 25. The circuit of claim 22 further comprising a capacitor and a
2 comparator coupled to the junction.

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1 26. The circuit of claim 22 further comprising a transistor
2 coupled to each current source and to the counter.

3 27. The circuit of claim 22 wherein the primary current source
4 generates a current I and each of the current sources generates a
5 current lower than I.

1 28. The circuit of claim 22 wherein the primary current source
2 generates a current I and each of the current sources generates a
3 second current lower than the current I, further comprising a
4 transistor coupled to each current source connected to the
5 counter.

1 29. The circuit of claim 21 wherein the means for varying the
2 frequency further comprises: /a

3 one or more voltage sources coupled to the control input;
4 and
5 a counter coupled to the output of the oscillator and to the
6 one or more voltage sources.

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1 30. The circuit of claim 22 wherein the oscillator further
2 comprises:
3 a primary voltage source coupled to the control input; and
4 a differential switch coupled to the primary voltage source.

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1 31. The circuit of claim 21 wherein the means for varying the
2 frequency further comprises:
3 a capacitor; and
4 a current source adapted to charge and discharge the
5 capacitor.

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1 32. The circuit of claim 31 further comprising:
2 one or more comparators coupled to the capacitor; and
3 the means for alternately charging and discharging the
4 capacitor.

1 33. A power supply having a transformer coupled to an input
2 voltage, the transformer having a primary winding, the power
3 supply comprising:
4 an oscillator for generating a signal having a frequency,
5 the oscillator having a control input for varying the frequency
6 of the signal, the oscillator including:
7 a primary current source coupled to the control input;
8 a differential switch coupled to the primary current
9 source;
10 a capacitor coupled to the differential switch; and
11 a comparator coupled to the differential switch;
12 a digital to analog converter coupled to the control input,
13 the analog to digital converter having one or more current

sources, wherein the primary current source generates a current I and each of the current sources generates a current lower than I ; a counter coupled to the output of the oscillator and to the current sources of the digital to analog converter; and a power transistor coupled to the oscillator and to one terminal of the primary winding, the power transistor modulating its output in providing a regulated power supply output.

34. A power supply having a transformer coupled to an input voltage, the transformer having a primary winding, the power supply comprising:

an oscillator for generating a signal having a frequency, the oscillator having a control input for varying the frequency of the signal, the oscillator including:

a primary current source coupled to the control input;

a differential switch coupled to the primary current source;

a capacitor coupled to the differential switch; and

a comparator coupled to the differential switch;

a circuit for varying the frequency, the circuit coupled to the control input, including:

a capacitor;

a current source adapted to charge and discharge the capacitor;

one or more comparators coupled to the capacitor to the current source for alternately charging and discharging the capacitor; and

a power transistor coupled to the oscillator and to one terminal of the primary winding, the power transistor modulating its output in providing a regulated power supply output.